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A NEW GENUS AND SPECIES OF PIGMY GOOSE FROM THE McKITTRICK PLEISTOCENE[1]

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Among the Pleistocene avian remains found by the California Institute of Technology in the asphalts of McKittrick are fourteen (complete and partial) tarsometatarsal elements of a goose more slender than any of the living Anserinae. Without attempting at this time to establish the identity of the form on the basis of other elements, it is here proposed to describe and record a new genus and species of goose on tarsal characters alone, the tarsus being a characteristic avian element, and in this instance well preserved, numerous and clearly generically distinct.

ACKNOWLEDGMENTS

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Dr. Chester Stock, in whose laboratory this study has been made, is thanked for continued encouragement and guidance.

Anabernicula gracilenta, n. gen. and n. sp.

Type.—No. 1169 Calif. Inst. Tech. Vert. Pale. Coll., left tarsometatarsus of

[1] Contribution No. 171. Balch Graduate School of the Geological Sciences, California Institute of Technology.

mature Anserine bird, complete and unworn, from the brea deposits of McKittrick, Calif., Pleistocene age.

Paratypes.—No. 1168, right tarsometatarsus, complete except for extended portions of hypotarsus, length 60.3 mm.; and No. 1170, left tarsometatarsus, proximal three-fifths.

Description.—Goose-like in general structure and proportions. Small and slender with delicately tapered shaft, broad spread of distal condyles, and diminished tarsal articulation.

Inner cotyla deeply cupped and of noticeably *slight extent anteroposteriorly.*[2]

Hypotarsus in lateral aspect rectangular, of relatively slight vertical extent, markedly strong in plantar depth. Inferior terminus of inner calcaneal ridge abrupt, with *slight gradient into shaft.*

Intermuscular line of the posterointernal border of shaft *deflected* inwardly toward the proximal end, effecting thus a disjunction with the inner calcaneal ridge. Extensor groove flattens out in its oblique descent across inner surface of shaft and weakens intermuscular line at junction.

Measurements of Type in Millimeters

Total length over all	61.8
Minimum shaft width (transverse)	4.4
Minimum shaft depth (anteroposterior)	3.4
Minimum shaft area, cross section (sq. mm.)	14.96
Transverse width proximal end	11.6
Anteroposterior depth proximal end (inner cotyla)	5.5
Anteroposterior depth proximal end including hypotarsus	11.0
Anteroposterior depth first calcaneal ridge	5.5
Transverse (total) extent of distal end (condyles 2, 3, 4)	10.4
Transverse extent of condyles 3 and 4	8.4
Minimum transverse width of condyle 2	2.9
Maximum transverse width of condyle 3	5.0
Mean transverse width of condyle 4	3.6
Anteroposterior depth of condyle 2	5.6
Anteroposterior depth of condyle 3	7.2
Anteroposterior depth of condyle 4	7.1
Minimum transverse width of prong shaft to condyle 4, taken from distal foramen to outer border	3.2

Generic Characters of Anabernicula

Although assignable only to the subfamily Anserinae or true geese, there are characters consistently present in the fossil tarsal specimens that relate to ducks and tree-ducks, Anatinae and Dendrocygninae respectively. Chief among these are the square-cornered outline of the hypotarsus as viewed from the inner side, its undercut effect at the distal confluence with

[2] Anteroposterior is the rotular-plantar axis.

shaft, and its marked plantar extent. Fig. 1A shows these distinctions in contrast to the characters seen in species of living pigmy geese (fig.1, B, C, D). Of 24 races of geese studied, none displays the above characters, while ducks and tree-ducks both possess them.

The deflection of the intermuscular line internolateral of the hypotarsus is a strong dendrocygnine structural feature, as is also the strap-like groove for the muscle *extensor hallucis brevis* upon the inner side of the shaft. In the Anserinae the groove is fine or cord-like as opposed to ribbon or strap-like in tree-ducks. This character in the fossil bird is intermediate, being fine-grooved proximally but widened distally on the approach to the intermuscular line. An unique feature is the flattening or weakening effect this has on the intermuscular line at this junction. This effect has not been noted in ducks (excepting the Muscovy Duck) or tree-ducks, and is only weakly if at all defined in geese

Proximal view of the head (fig. 1A upper) shows a more restricted articulation area as compared with that in other geese (actual and relative), an excessive development of the first calcaneal ridge anteroposteriorly, and a small circular deeply cupped inner cotyla of limited anteroposterior diameter.

The above structural features deserve generic distinction, while the following goose-like characters maintain the status of the new group within the Anserinae: The tapering and proportions of the shaft eliminate Cygninae, Anatinae, Dendrocygninae and are typical of Anserinae. The swelling of shaft into condylar prongs, the spacing, and the total spread of the distal condyles are separable by detail or proportion from all others but the Anserinae.

Specific Characters of Anabernicula gracilenta

Anabernicula gracilenta as a species can be "hand picked" from mingled tarsi of other pigmy geese by an appearance of delicacy and dwarfness. The ranges in size of its component parts as given below are considered fair delimitation for the species, inasmuch as the number of fossil specimens equaled or surpassed Recent specimens of each species studied. Both mature and immature individuals were present.

The seventeen fossil specimens of tarsometatarsus fall into a very consistent clustered group when measured in certain ways. Various units of study and ratios between measurements give specific and even generic distinctness to the fossil group. In the living pigmy geese no such sharpness

between groups and rarely any tendency to generic separation has appeared in the numerous measurements and ratios exacted of their tarsi.

There are, however, size and proportional figures that yield no distinctions between *Anabernicula gracilenta* and the four pigmy races of native geese. Such characters are frequently of subfamily rank, inasmuch as they unite the goose group and serve to distinguish it from Anatinae, Cygninae, and Dendrocygninae.

Life Characteristics

This small goose outnumbers several times over the individuals of other geese occurring in the McKittrick collections of the California Institute. The larger geese are noticeably infrequent in this and other collections of McKittrick material. The relative abundance of the pigmy goose would seem to indicate special attractiveness of the locality as afforded perhaps by shallow ponds and mud flats.

Anabernicula gracilenta possesses more slender proportions than any known goose, and is smaller in bulk and weight than any goose living with the exception of *Chenonetta* of Australia.

The resemblance of the fossil goose to *Branta bernicla* in length of tarsometatarsus and in some other gross features leads one to picture the extinct waterfowl as of similar but slighter build than the black or sea brant. Standing in equal height of limb, *A. gracilenta* weighed much less than the brant, probably approaching the tree-duck in weight.

The spread of the distal condyles for digital articulation, while distinctly goose-like and not duck-like, nevertheless falls away from the goose type when considered in proportion to length of shaft. In this regard it joins in close proportional similarity to the tree-ducks. *Chloephaga,* the upland goose, noted for its terrestrial habits, favors this narrow foot and long shaft proportion. It is significant that this proportional study throws sharp distinction between the fossil goose and the goose nearest it in size, namely *Branta bernicla,* while at the same time placing it nearer to *B. c. minima* and *C. rossii.* The latter two geese spend a considerable part of their lives upon the land, while *Branta bernicla* is a marine forager that spends little time ashore. It might be further pointed out that *Philacte canagica,* our most maritime goose, shows an extreme disproportion toward short shank and wide foot, and that the swan (*Cygnus columbianus*), strongly aquatic, falls well within the same grouping.

Considering the characters, slender shaft, length of shaft, small proximal weight-bearing articulation, reduced spread of digital condyles,

and considering the inference given above as based upon the ratio of foot-spread to tarsal length, this Brea Pigmy Goose appears in mind as an agile, light-bodied goose of active, walking habits frequenting, in company with shorebirds, mud flats and borders of ponds.

Anabernicula (Anas-bernicla, duck-goose) denotes the relationship of the new goose genus, while *gracilenta* denotes the delicacy and grace suggested in many features by the specimens at hand.

Faunal Range

In the fossil collections of the University of California at Los Angeles there are six tarsi of pigmy geese: two from Rancho La Brea, three from McKittrick, and one from Fossil Lake, Oregon. These were shown to me in 1931 by Dr. Loye Holmes Miller, who kindly permitted the study of them.[3] One of the two "pigmy geese" cited from Rancho La Brea as *Branta*(?) sp. by Miller[4] and two from McKittrick referred to the *Chen hyperboreus* group of the same author[5] classify readily as *Anabernicula gracilenta*. The Fossil Lake specimen, however, is not referable to the latter form.

Branta minuscula, described by Alexander Wetmore[6] from a proximal half of a humerus presents characteristics which might be expected in humeri of *A. gracilenta*. If the geologic position of *Branta minuscula* is Upper Pliocene, as determined by J. W. Gidley, considerable difference in age prevails between these two similar forms from Arizona and Southern California.

Summary

A total of sixteen tarsometatarsal elements of a small goose from the Pleistocene asphalts of McKittrick and one specimen from Rancho La Brea furnish the basis for establishing a new genus of goose. In certain characters, as displayed in the regoin of the hypotarsus and on the inner extensor groove, this form shows resemblance to the tree-ducks. The species represented is smaller than *Branta bernicla* and evidently more slender than any living goose.

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[3] Miller, Loye H. A second avifauna from the McKittrick Pleistocene: The Condor, vol. 37, p. 76, 1935.

[4] Miller, Loye H. The birds of Rancho La Brea: Carnegie Inst. Wash. Publ. No. 349, p. 73, 1925.

[5] Miller, Loye H. Avifauna of the McKittrick Pleistocene: Univ. Calif. Publ., Bull. Dept. Geol. Sci., vol. 15, No. 9, pp. 314, 315, 1925.

[6] Wetmore, Alexander. Fossil birds from southeastern Arizona: Proc. U. S. Nat. Mus., vol. 64, art. 5, pp. 6-7, 1924.

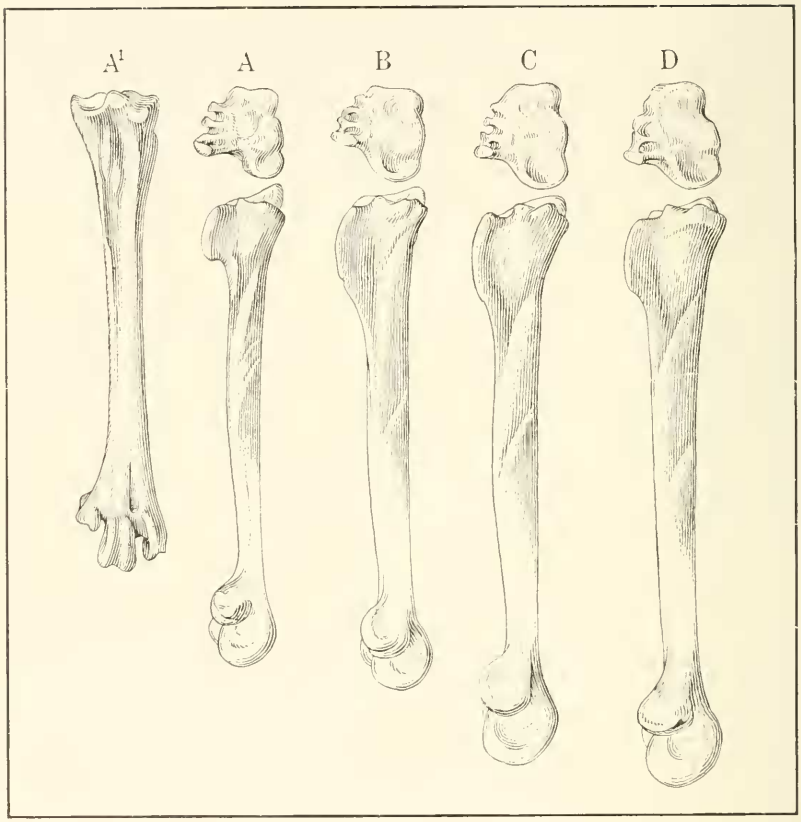

Fig. 1. Right tarsometatarsi of pigmy geese. Natural size.

A1. **Anabernicula gracilenta,** Type, anterior view.

A. **Anabernicula gracilenta,** Type, inner lateral and proximal views.

B. **Branta bernicla hrota,** inner lateral and proximal views.

C. **Branta canadensis minima,** inner lateral and proximal views.

D. **Chen rossii,** inner lateral and proximal views.

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Fig. 2. Total length of tarsometatarsus.
Extensions beyond arrows indicate extremes listed in standard texts for tarsal lengths in skin specimens. In C (*B. c. minima*) skin measurements taken by author have been added to skeletal series.

Fig. 3. Inner cotyla, proximal end, anteroposterior depth.

Fig. 4. Articulation area proximal end. Transverse width x cotyla depth (anteroposterior).

Fig. 5. Maximum depth condyle 4 (anteroposterior).

Fig. 6. Ratio of anteroposterior depth of inner proximal cotyla (Fig. 3) to anteroposterior extent of inner calcaneal ridge.

A. **Anabernicula gracilenta.**
B. **Branta bernicla** (2 races).
C. **Branta canadensis minima.**
D. **Chen rossii.**

Fig. 2.

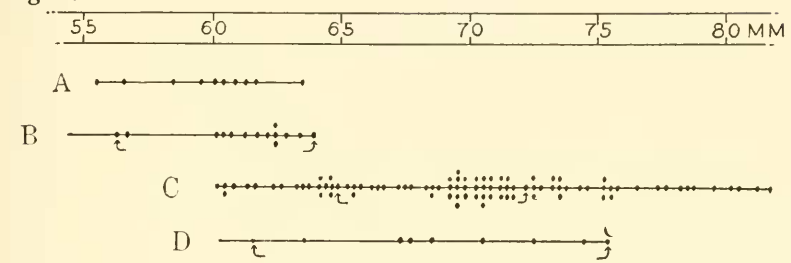


Fig. 3.

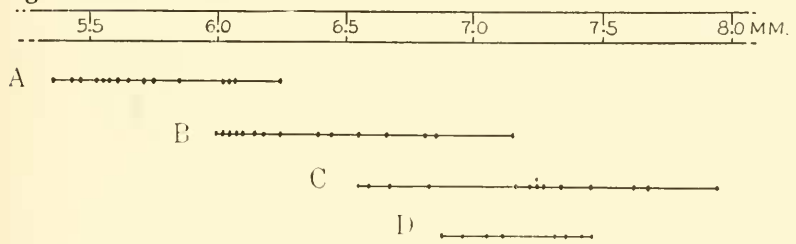


Fig. 4.

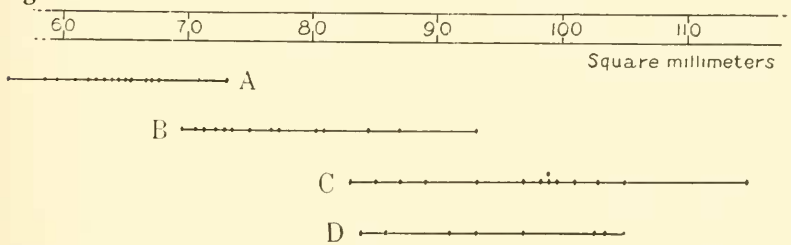


Fig. 5.

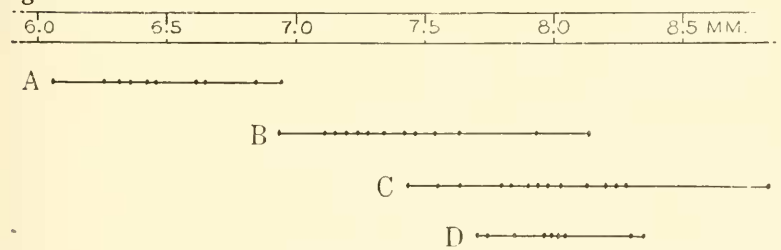
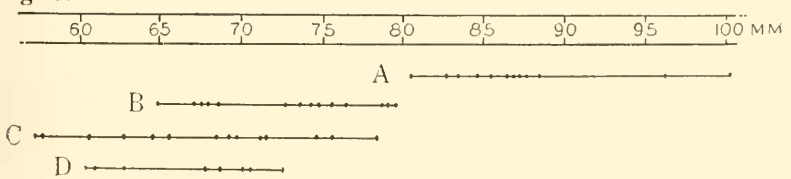


Fig. 6.



Explanation of figures will be found on opposite page.